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Endovascular Therapy versus Standard medical Treatment for Vertebrobasilar Artery Occlusion: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 23 September 2025 and was last updated on 2 December 2025.

INTRODUCTION

Review question / Objective To systematically evaluate and compare the efficacy and safety of endovascular therapy versus standard medical treatment in patients with vertebrobasilar artery occlusion, by synthesizing evidence from both randomized controlled trials and observational studies.

Condition being studied Vertebrobasilar(VBAO) account for about 1-2% of all ischemic strokes,is associated with high mortality and severe disability. Endovascular treatment (EVT) for anterior circulation stroke have demonstrated its efficacy, establishing it as a standard of care.of patients with VBAO suffer from severe disability and mortality.Numerous randomized controlled trials (RCTs) on endovascular treatment (EVT) for anterior circulation stroke have demonstrated its efficacy, establishing it as a standard of care. In contrast, the evidence for EVT in VBAO has developed more slowly and with greater difficulty.

METHODS

Participant or population Stroke patients with Vertebrobasilar artery occlusion.

Intervention EVT with standard medical treatment SMT(with intravenous thrombolysis if suitable).

Comparator SMT only (with intravenous thrombolysis if suitable).

Study designs to be included Randomized controlled trials and observational cohort studies (prospective and retrospective).

Eligibility criteria Inclusion criteria
Studies were selected based on the PICO framework:
1.Population: adults (≥16 years) with acute vertebrobasilar artery occlusion (VBAO).
2.Intervention: Endovascular therapy (EVT), with or without intravenous thrombolysis (IVT).

3.Comparison: Standard medical treatment (SMT). Patients in each treatment group received the standard medical care, including IVT agents, antiplatelet drugs, anticoagulation, or combinations of these treatments according to the national and institutional guidelines(6).
4.Outcomes: The primary outcome was a favorable functional outcome (mRS score 0–3 at 90 days). Secondary outcomes included functional independence (mRS 0–2 at 90 days), sICH, and all-cause mortality at 90 days.
Exclusion criteria
1. Single-arm studies.
2. Studies with any treatment group containing less than 10 patients.
3.Overlapping datasets and studies with missing outcomes data.
4.Non-English-language studies.

Information sources We searched PubMed, Embase, and the Cochrane Library from January 1, 2000 to July 1, 2025 for English-language studies.

Main outcome(s) Modified Rankin Scale(mRS) score of 0-3 at 90 days.

Additional outcome(s) Secondary outcomes included functional independence (mRS 0–2 at 90 days), sICH, and all-cause mortality at 90 days.

Quality assessment / Risk of bias analysis For the assessment of methodological quality and bias risk, Two authors independently evaluated each randomized controlled trial (RCT) using the Cochrane Risk-of-Bias tool for Randomized Trials (RoB) .We used the Newcastle-Ottawa Scale to assess the quality of these cohort study.

Strategy of data synthesis To minimize confounding bias, the primary meta-analysis prioritized adjusted effect estimates, with covariates adjusted in each included study (including age, baseline NIHSS score, and comorbidities; details specified in Table S2). Adjusted ORs were directly utilized when available. For studies reporting adjusted risk ratios (RRs), RRs were converted to ORs using the following formula: $OR \approx RR / (1 - p_0 + p_0 \times RR)$, where p_0 represents the event rate in the control group(14). Studies lacking adjusted estimates (primarily due to low event rates prohibiting multivariate adjustment) were retained to mitigate potential selection bias; unadjusted ORs were calculated from raw 2×2 contingency tables for these studies.
The distribution of mRS outcomes was visualized with a sequential plot (Figure S1), synthesizing data from studies reporting original mRS ordinal data. Patient-level mRS data were independently extracted from publications by 2 reviewers. Additionally, ORs for favorable functional outcome (defined as mRS 0–3) were calculated based on the extracted original mRS data to quantify treatment effects on functional recovery.
Meta-analytic models were selected according to outcome traits and heterogeneity:
1.For outcomes with pre-calculated effect estimates, the inverse-variance (IV) method was applied.
Heterogeneity was assessed using the I^2 statistic
A random-effects model was used if I^2>50%; otherwise, a fixed-effect model was adopted.
2.For sICH, the Mantel–Haenszel (MH) fixed-effect model was used due to the low event frequencies, with unadjusted ORs derived from 2×2 contingency tables.

Subgroup analysis Pre-specified subgroup analyses were conducted for the primary outcome based on age, sex, baseline stroke severity (NIHSS), pc-ASPECTS, IVT administration, occlusion site, and OTA time.

Sensitivity analysis Sensitivity analyses included a leave-one-out analysis and a meta-analysis restricted to adjusted ORs.

Country(ies) involved China.

Keywords vertebrobasilar artery occlusion, endovascular threapy, standard medical treatment, functional outcome

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